(12) UK Patent Application (19) GB (11) 2 278 002 (13) A

(43) Date of A Publication 16.11.1994

(21) Application No 9409592.4

(22) Date of Filing 13.05.1994

(30) Priority Data
(31) 9309914 (32) 14.05.1993 (33) GB

(51) INT CL[5]
G06K 5/00

(52) UK CL (Edition M)
G4H HTG H1A H13D H14A
U1S S1819 S2120 S2271

(56) Documents Cited
GB 1554585 A GB 1484042 A

(58) Field of Search
UK CL (Edition M) G4H HTG
INT CL[5] G06K, G07F

(71) Applicant(s)
Abathorn Limited

(Incorporated in the United Kingdom)

Orchard Brae House, 30 Queensferry Road, EDINBURGH, EH4 2HG, United Kingdom

(72) Inventor(s)
Rodney Fouracres
Graeme Scott Douglas

(74) Agent and/or Address for Service
Cruikshank & Fairweather
19 Royal Exchange Square, GLASGOW, G1 3AE, United Kingdom

(54) Security systems

(57) A system for enabling verification of the identity of a bearer document, such as a cheque, comprising a computer controlled laser printer 3 for printing data onto the document. The printer comprises a microprocessor 11 for extracting at least two value critical data items from a received stream of open-form data items and for encoding said extracted data items into a coded non-user readable form. The printer is arranged to print said coded data items together with said received data items onto the document. Verification means 31 is provided for reading and decoding said coded data items from the document and for displaying the decoded data items to allow a visual comparison to be made with said printed open-form data items (or the comparison may be done by the verification means).

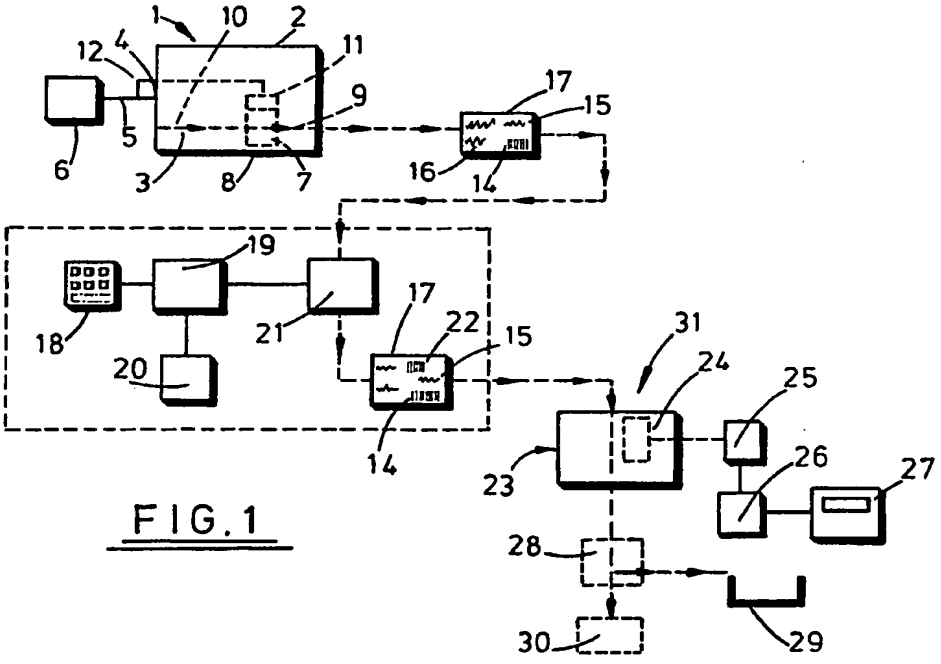

FIG.1

GB 2 278 002 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

1 / 1

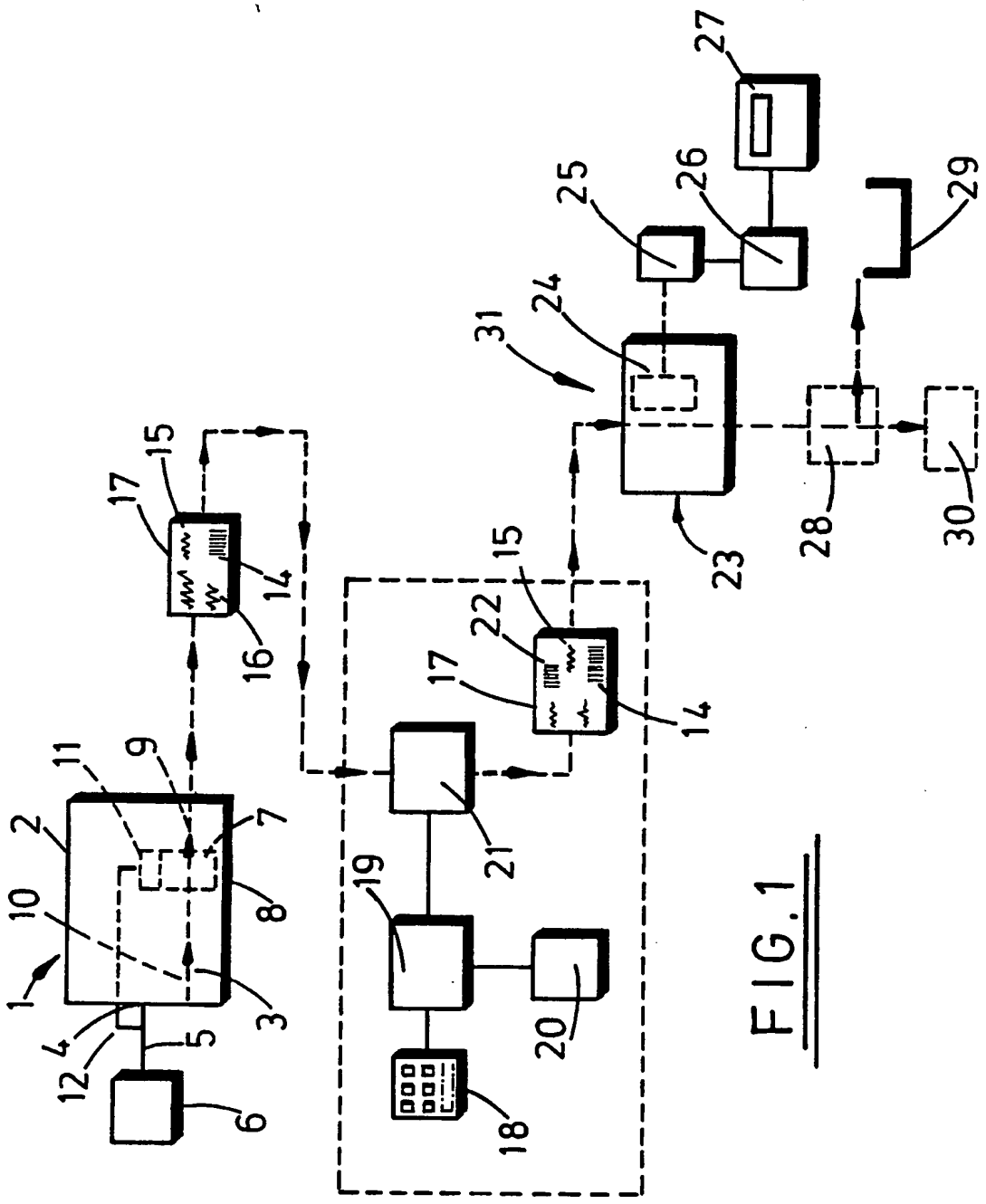
1
2
3
4
5
6
7
8
9
10
11
12
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

FIG. 1

2278002

SECURITY SYSTEM

The present invention relates to security systems and in particular to systems for verification of so-called bearer documents such as cheques, stocks, bonds, and certificates whose value is determined by critical data items such as expiry dates, monetary amounts, and beneficiary identity, printed on them.

The production of such documents often involves a high degree of mechanisation with high speed printing (up to 50 pages per minute or more) using laser or impact printers. Unfortunately this type of printing is vulnerable to fraud by dishonest persons as it can be lifted from the face of the documents and replaced by new data.

Various more or less complex security systems have been previously proposed for various applications to combat fraud. These have various drawbacks such as considerable complexity, ease of circumvention, need for substantial changes to normal procedures and so on.

One system that has previously been proposed in GB 1,484,042 uses special enciphering devices to generate a so-called crypto-number by processing the values amount data, and a specially generated serial number using a secret code. The crypto-number, serial number and amount data are all printed on the document which is later processed by a special document assessing apparatus which has a similar enciphering device which generates a crypto-number in the same way from the printed serial number and amount data and the same secret code and then compares the newly generated crypto-number with the printed crypto-number. If the amount data has been changed then the newly generated crypto-number will not match the printed one.

A major weakness with such a system is that once the secret code used in the enciphering device to generate the crypto-number becomes known, then it is relatively easy for a fraudster to generate and apply a suitable new crypto-number to match the altered amount data, and since the enciphering device needs to be available to a number of users, there is a problem in protecting the secrecy of the secret code.

It is an object of the present invention to avoid or minimize one or more of the above disadvantages.

According to a first spect of the present invention there is provided a bearer document verification system comprising:
primary bearer document writing means comprising:
a primary computer controlled printer apparatus having input means for receiving a data stream from a computer for high speed automated mass production of bearer documents, and containing a plurality of data items to be printed onto each bearer document in open user-readable form, at least two of said data items being value critical, and printing said data items in said open form on said bearer document,
computer means programmed so as to extract from said data stream at least two said value critical data items and generate printing instructions for a coded machine readable form of said at least two extracted data items in accordance with a predetermined code;
printer means having input means for receiving said printing instructions for said coded form of extracted data items and formed and arranged for printing thereof substantially immediately onto said bearer document, whereby printing of the open and coded data items may be effected in a single pass through said writing means;

bearer document verification means comprising: bearer document reading means for reading at least the machine readable coded form of said at least two value critical data items printed on said bearer document, and including processing means formed and arranged for converting the coded form of said at least two value critical data items into a form comparable with the open form thereof, in accordance with said predetermined code, to permit comparison of said coded and open forms of said at least two value critical data items.

According to a second aspect of the present invention there is provided a system for verifying the identity of a bearer document and comprising: primary bearer document writing means comprising: a primary computer controlled printer apparatus for the automated print production of bearer documents and having input means for receiving a data stream , the data stream containing a plurality of data items to be printed onto each bearer document in open user-readable form with at least two of said data items being value critical, and means for printing said data items in said open form onto the bearer documents; computer means programmed to extract from said data stream both, or at least two of, said value critical data items and to encode these data items into a coded machine readable form which form is substantially non-user readable without the aid of additional equipment, in accordance with a pre-determined code for printong on said document; printer means having input means for receiving said printing instructions in coded form and arranged to print the received items substantially immediately onto said bear document, so that in printing of the open form and coded items may be effected in a single pass through said writing means;

said system further including bearer document

verification means comprising bearer document reading means for reading at least the machine readable coded data items printed on the bearer document and processing means for converting the read coded data items into a form suitable for comparison with the open data items printed on the document.

The comparison may simply be effected manually by outputting the decoded value critical data items to a visual display unit to allow comparison thereof with the open form on the bearer document by an operative. Conveniently though there is used (the same or additional) reading means formed and arranged to read machine readable open (user-readable) forms of said at least two value critical data items and comparator means are provided for automatically comparing said open and decoded forms of said at least two value critical data items and providing an output indicating correspondence or otherwise thereof.

With the system of the present invention a significantly increased level of security can be readily incorporated into existing cheque processing systems with limited additional costs and minimal disruption. Thus, for example, a bulk cheque issuer such as a welfare payment agency can simply incorporate suitable computer means to extract value critical data such as the payment amount and use it to generate printing instructions for the coded machine readable from thereof which may be used to drive the existing printer used to print the normal data on the cheque, or another printer device. When the cheque is subsequently presented for encashment or payment into a bank account, the teller will read off the open form of the payment amount and beneficiary identity and either key in said details into a computer

terminal to transfer said amount into the beneficiaries account or pay out said amount directly.

Under existing practice no system for authenticating the value critical data or beneficiary exists in any bank, building society, post office or similarly authorised encashment facility other than by visual means. Thus by utilising a simple electronic code reading device installed at the point of presentation of the bearer document the teller is instantly able to compare the secure encoded form of the critical data with the open form data and immediately highlight any discrepancy whether it be due to fraudulent alternation of the open form of the amount and or beneficiary or an amount inputting error by the teller.

Furthermore when the cheque or bearer documents are amount encoded in intra-bank processing the same verification procedures and processes can be utilised and installed to outsort any amount encoding input errors and consequently virtually eliminate inter-branch and/or inter-bank balancing discrepancies.

When implementing the system of it is not necessary to use any highly complex enciphering system for generating the coded machine readable form of the value critical data item. Advantageously there is simply used a means for printing the coded form in a way that is more or less unobtrusive and not readily identifiable by or intelligible to the fraudster e.g. using invisible ink and/or difficult to reproduce manually or simply, e.g. using ordinary or more complex bar-coding.

In order to minimize disruption to existing processing systems, it is desirable that the primary printer apparatus should, in accordance with existing practice,

be a high speed printer such as a laser printer to maintain processing speed. As noted above, this printer could also be used for printing certain types of coded form of value critical data items e.g. bar-coded or other symbolic types, or coded alpha, numeric, or alphanumeric forms.

Having regard to the fact, though, that the coded form of data would normally only constitute a small part of the whole of the data to be printed on the cheque or other bearer document, a different and slower printer e.g. a line printer such as an ink-jet printer could be used for this thereby allowing the use of e.g. invisible ink for the printing of the coded form of data without unduly slowing the cheque writing process. Suitable invisible inks that may used are known in the art. In the case of the use of invisible inks the electronic reading device would automatically "illuminate" the machine readable code.

With regard to the computer means used to extract the value critical item from the data stream, it will be appreciated that this involves only a relatively small computational load so that this may readily be effected by a microprocessor which can easily be incorporated into the printer means used for the coded form of the value critical data item, which in turn could conveniently be integrated with the primary printer apparatus.

It will further be appreciated from the above that the system of the present invention is particularly suitable for integration with existing bearer document processing systems not only from an operational point of view but also in relation to its suitability for retro-fitting into existing conventional systems thereby providing a

particularly convenient and economic means for achieving a significant increase in security.

In a further aspect the present invention provides a method of enabling the authenticity of a bearer document to be verified and comprising the steps of:
receiving a data stream comprising a plurality of data items to be printed on the bearer document in open user-readable form, at least two of the data items being value critical;
extracting from the data stream both, or at least two, value critical data items and encoding the extracted data items into a form which is substantially non-user, readable without the aid of additional equipment, for printing on the bearer document in accordance with a predetermined code in a non-user readable, machine readable and decodable, form, and printing the data stream of data items together with the encoded data items onto the bearer document.

Further preferred features and advantages of the present invention will appear from the following detailed description given by way of example of a preferred embodiment illustrated with reference to the accompanying drawings in which:
Fig. 1 is a schematic block diagram of a bearer document verification system of the present invention.

Fig. 1 shows a verification system 1 comprising a primary cheque writing means 2 in the form of a computer controlled laser printer 3 having an input 4 connected by a printer lead 5 to a cheque issuing computer 6 for conducting a data stream containing all the data items such as payee name, date, amount in figures and words, and signature etc., to be printed on each cheque in the normal way. An ink-jet line printer device 7 is mounted

within the housing 8 of the page printer 3 at a downstream end portion 9 of the cheque path 10 through the page printer 3. A microprocessor 11 is coupled 12 to the printer lead 5 for extracting the value critical data item comprising the payment amount from the data stream passing therethrough and produces an output (using suitable encoding software) in the form of suitable printer commands which are supplied 13 to the ink-jet printer 7, to produce a bar-coded form 14 of the payment amount which has been printed in open form 15 thereof along with the other usual data items 16 on the cheque 17.

An alternative system can be provided by a computer (for example a desk-top personal computer) coupled to an ordinary laser printer, the computer being arranged to extract, and encode, said value critical data items from a data stream emanating from the computer keyboard. Both open-form and encoded data items are supplied to the printer in a "ready to print" format.

When the beneficiary or payee presents the cheque to a bank or similarly authorized encashment facility, the teller feeds the said cheque into an automatic verification means 31 comprising of the reader 23 which has a suitable reading head 24 (and in the case where invisiable inks are utilised an illumination device) for scanning at least two items of critical data, usually the amount 22 and the beneficiary identity in the encoded form 14 originally printed on the documents 17.

The latter, and if necessary, the former, are decoded by suitable processor means 25, and compared by comparator means 26 which provides an output to a suitable visual display unit 27 indicating correspondence or otherwise of these two items. Alternatively there may be included

an automated sorting device 28 for diverting any cheques with discrepancies to a separate review station 29 and/or an alarm device 30 for signalling detection of any discrepancy. Naturally other routine processing means such as computer means formed and arranged for debiting the payer's account with payment amounts from cheques passed as correct by the verification system may be included in the normal way but are not shown specifically in the drawing.

An alternative or subsequent process can incorporate the same said verification device and alarm system utilising the said selected and encoded critical data where an operator enters the amount data from the open form via a key pad 18 of a computer terminal 19 which activates a receipt printer 20 and a secondary encoding means comprising a secondary printer 21 which may be of any convenient type and prints the entered amount in any convenient form 22 onto the cheque 17 which is then passed on in the normal way through the bank clearing system.

Although the system of the present invention is particularly useful for cheques, it is also applicable to a wide variety of bearer documents. In this connection it will be appreciated that the system can readily be optimized for particular applications. Thus for example in the case of vehicle tax discs which are normally mounted on the inside of a vehicle windscreen, there would normally be used a compact portable battery or solar cell powered bearer document verification device which need only to read and decode said at least two value critical data items, usually the expiry date and the vehicle registration number, and display the open user-readable forms thereof on a suitable visual display unit, generally a liquid crystal display device,

to allow the user to compare the displayed decoded data items with the open forms thereof printed on the tax disc. Conveniently the coded forms are in a form which can be read by swiping a suitable reading head over them - e.g. a bar code readable by a bar code reading device.

It will be appreciated that the dual-form data applied to documents using embodiments of the present invention also allows data recovery where part of the open-form data has been obscured or otherwise made unreadable. For example, if a user's name has been obscured, the name can be recovered if the name was selected as a value critical data item and printed on the document in an encoded form. This can help to avoid or minimise processing problems within the bank clearing system.

For the avoidance of doubt the expression "production of bearer documents" in the context of the present invention means the printing of substantially all the relevant transaction specific data items required to give effect to a bearer document e.g. in the case of a cheque: beneficiary identity, date, payment amount, and, in some cases, facsimile signature. The printing may moreover be effected on a blank bearer document including standard features and data such as the identity and account details of the payer and the name of the bank issuing the bearer document, or may even in some cases included printing some or all of the standard data and other features onto plain paper or partially prepared blank forms.

Various modifications may be made to the above described embodiment within the scope of the present invention. For example, coding of value critical data items may be achieved by enabling the printing of data items in any form which is substantially non-user readable without

the aid of additional equipment. Various non-alphanumeric printing methods in addition to bar-code printing may be used. Alternatively, printing may be carried out in "invisible" ink which is subsequently made visible by the vertification reading means.

CLAIMS

1. A system for verifying the identity of a bearer document comprising: primary bearer document writing means comprising: a primary computer controlled printer apparatus for the automated print production of bearer documents and having input means for receiving a data stream, the data stream containing a plurality of data items to be printed onto each bearer document in open user-readable form with at least two of said data items being value critical, and means for printing said data items in said open form onto the bearer documents;
computer means programmed to extract from said data stream both, or at least two of, said value critical data items and to encode these data items into a coded machine readable form which form is substantially non-user readable without the aid of additional equipment, in accordance with a pre-determined code, for printing on said document;
printer means having input means for receiving said printing instructions in coded form and arranged to print the received items substantially immediately onto said bearer document, so that printing of the open form and coded data items may be effected in a single pass through said writing means;
said system further including bearer document verification means comprising bearer document reading means for reading at least the machine readable coded data items printed on the bearer document and processing means for converting the read coded data items into a form suitable for comparison with the open data items printed on the document.

2. A system according to claim 1, wherein said data stream is received from a computer formed and arranged for supplying a data stream to a said printer apparatus

for enabling the high speed automated mass production of bearer documents.

3. A system according to claim 1 or 2 wherein the document reading means comprises a display unit for displaying the decoded data items to allow a visual comparison with the corresponding open form data items printed on the document.

4. A system according to claim 1 or 2 wherein the document reading means comprises means for reading the data items printed on the document in open form and comparison means for automatically comparing the read open data items and the decoded data items to provide an output indication of the correspondence.

5. A system according to any one of the proceeding claims, wherein said document is a cheque.

6. A system according to any one of the proceeding claims, wherein said printing means is arranged to print the coded data items in invisible ink.

7. A system according to any one of claims 1 to 6, wherein said computer means encodes the extracted data items by converting them into non-alphanumeric printable characters.

8. A system according to claim 7, wherein the printing means is arranged to print the coded data items in the form of a single or multi-dimensional bar code.

9. A system according to any one of the proceeding claims, wherein the printer means for printing the coded data items, the printer means for printing the user

readable data items, and the computer means are integrated into a single unit.

10. A method of enabling the authenticity of a bearer document to be verified and comprising the steps of:
receiving a data stream comprising a plurality of data items to be printed on the bearer document in open user-readable form, at least two of the data items being value critical;
extracting from the data stream both, or at least, two, value critical data items and encoding the extracted data items into a form which is substantially non-user readable without the aid of additional equipment, for printing on the bearer document in accordance with a predetermined code in a non-user readable, machine readable and decodable, form, and printing the data stream of data items, together with the encoded data items, onto the bearer document.

11. A method according to claim 10, for the high speed automated mass production of bearer documents wherein said value critical data item extraction is applied to a data stream received from a computer formed and arranged for supplying a data stream to a said printer apparatus for enabling the high speed automated mass production of bearer documents.

12. A method according to claim 10 or 11, wherein said coded data items are printed onto the document in a form which cannot be read by the unaided eye.

13. A method according to claim 10, 11 or 12 wherein the step of encoding the extracted data items does not involve the use of an encryption key.

14. A method of verifying the authenticity of a document produced in accordance with the method of anyone of claims 10 to 13, and comprising reading the encoded data items from the document and decoding them into a form which enables a comparison to be made with the open form data items printed on the document.

15. A method according to claim 14 and including the step of visually displaying said decoded data items to allow a visual comparison to be made with the open form data items printed on the document.

16. A method according to claim 14, which includes the step of additionally reading by means of a machine said open form data items printed on the document and carrying out an automated comparison between said read open form data items and said decoded said items and providing an output indication of the correspondence.

17. A system for verifying the authenticity of a document substantially as herein before described with reference to the accompanying drawing.

18. A method of verifying the authenticity of a document substantially as herein before described with reference to the accompanying drawing.

Patents Act 1977 **Examiner's report to the Comptroller under Section 17** **(The Search report)**	Application number GB 9409592.4
Relevant Technical Fields (i) UK Cl (Ed.M) G4H (HTG) (ii) Int Cl (Ed.5) G06K, G07F	Search Examiner M J DAVIS Date of completion of Search 27 JUNE 1994
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii)	Documents considered relevant following a search in respect of Claims :- 1-18

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 1554585	(FUJITSU ET AL) whole document	1, 10 at least
X	GB 1484042	(GRETAG) whole document, especially page 3 line 125 to page 4 line 9	1, 10 at least

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).